

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

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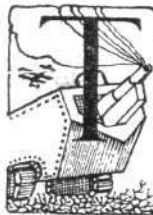
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### DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Dec. 15-	
Jan. 2....	Paris Aero Exhibition.
1923.	
Jan. 3 ....	F.A.I. Paris Conference.
Jan. 12 ....	Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.
Jan. 26 ....	Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.
Feb. 6-7....	Third Air Conference at the Guildhall.
Feb. 9 ....	Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.
Feb. 23 ....	Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.
Mar. 15 ....	Entries close for Dutch Height Indicator Competition.
Apl. 12 ....	Lecture, "Some Controversial Points in Aircraft Design," by F. T. Hill, before I.Ae.E.
May 11 ....	Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.
June ....	International Air Congress, London.
Dec. 1 ....	Entries close for French Aero Engine Competition.
1924.	
Mar. 1 ....	French Aero Engine Competition.

## EDITORIAL COMMENT.



TAKing it all around, the year which is just closing has been a somewhat uneventful one so far as aviation, and especially British aviation, is concerned; 1922 has seen no epoch-making flights such as the London-Australia or Transatlantic flights of previous years, while in ordinary sporting aviation it is to be feared that this country is lagging sadly behind. On the other hand, the period of depression which Britain, in common with all others, has been passing through, certainly appears to be drawing towards a close. Personally we are of opinion that the bottom of the curve has been reached, and that from now onwards there will be a rise, slow at first, but gradually increasing as time goes on. Thus, although there is much in the past year which one must view with regret, there is also a good deal for which to be thankful, and it is quite possible that in years to come 1922 will stand revealed as having been far more full of results than is possible to appreciate at the moment. It is usually the case that not until distance in time has lent perspective can we see things in their true proportions, and we are still too close, even to the beginning of 1922, to have that perspective.

As far as the Royal Air Force is concerned, 1922 has certainly not been the dull year of which civilian aviation can complain. We do not propose here to attempt to give even a brief review of what has happened in and to the R.A.F. during the past year. To do so at all adequately would require several issues of FLIGHT. But a few isolated milestones which stand out on the road of progress may be recalled in order to form, as it were, certain fixed points on which future events in the R.A.F. may well be found to pivot.

Thus the believers in and supporters of a strong Air Force may well claim with satisfaction that 1922 was of importance in that it was the year in which the R.A.F. received its *Magna Charta*. It will be recalled that at the Air Conference Capt. Guest reminded some of his critics that the Air Ministry had been engaged in a fight for its very existence.

We all remember the anxiety caused by the attempts of certain reactionary sections of the Navy and the Army, particularly the former, which were working quietly but none the less energetically for a return to the old evil system of separate air services, which in the past led to so much overlapping, duplication and waste. Ultimately came the official announcement that there was no intention on the part of the Government to allow such a retrograde step to be made. Not only so, but it was generally admitted that the R.A.F. is rapidly becoming our first line of defence. Once this realisation becomes general, half the battle is won, and the rest, although of tremendous importance, is but detail in natural evolution. We believe that, although even now there are those who still hope to effect a change in the fundamental organisation of the air service, the new Government will not allow such a step to be taken, and we look forward hopefully to what the coming year will bring.

A second milestone in the life of the R.A.F. has been the taking over of the command of Iraq. For the first time in history an air service has been placed in supreme control of a territory. It is yet too early to be able to form a definite opinion of the success or otherwise of this experiment, but, knowing the R.A.F. and the officers in charge of this responsible task, we have little fear as to the outcome.

A third milestone, and one which will play an extremely important part in the formation of a school of thought in the R.A.F. in the foundation of a policy, and in the building up of the new First Line of Defence, was the establishing at Andover of the R.A.F. Staff College, under the Command of Air-Commodore Brooke-Popham. Quite recently we were privileged to pay a visit to the College, and chronicled its results. It is, therefore, not necessary to go into details here, beyond recalling with satisfaction that the College was opened formally on April 4, 1922, and that already the work is in full swing, and promising well for the R.A.F.

Before leaving the subject of the Royal Air Force, there is one thing of which we should like to remind the present Government, and that is the fact that, if the R.A.F. is to do its Imperial work efficiently and well, it is essential that new types of machines should be forthcoming in reasonably large numbers. During the past year the R.A.F. has had to work mainly with old types, re-conditioned so as to be serviceable in a measure, but being at the best a makeshift which, with the rapid progress being made all over the world, cannot be regarded as adequate for the coming year. It is fatal, in the interests of National safety, to rest satisfied with this policy; nor will it be found to be true economy. It must, therefore, be insisted upon that the placing of orders on a much larger scale during 1923 than was the case in 1922 should be a vital and prime necessity. It is for our new Air Minister, Sir Samuel Hoare, to see that the requirements of the Air Force are not side-tracked.

**Commercial Aviation.** It must be admitted that so far as civil aviation is concerned, 1922 was not at all a successful year. During the first part of the year three subsidised British services were operated on the London-Paris route, with the result that there was competition and overlapping of ground organisation. Some time ago this arrangement was altered, thanks to the foresight of General Sir Sefton Brancker, Director of Civil

Aviation, and now the three firms subsidised by the Government are operating on three different routes.

It is to be hoped that in the coming year the two new air routes—to Brussels and Cologne in the one case and Manchester-London-Amsterdam in the other—will be considerably extended so as to link up with places farther afield. In spite of the unfavourable report of the C.A.A.B. on Imperial air services, we trust that a step forward will be found possible during 1923, either by the extension across Europe of some of the existing services, or by the adoption of the airship schemes.

The opening in the coming spring of a seaplane service between Southampton and towns in the north of France will mark another step in the right direction.

♦ ♦ ♦

#### Sporting Aviation

As already mentioned at the beginning of these notes, the past year has not been a very encouraging one in the matter of sporting aviation. The few flying meetings and competitions held in this country have not been of a nature to draw the eyes of the world towards British aviation. Most of the meetings have been in the main "family affairs" into which the world at large did not enter. In the matter of world's records we have done rather badly; not a single one, with the glorious exception of the Supermarine seaplane record during the Schneider race, standing to the credit of a British machine or a British pilot. It is true that James has come within an ace of beating the speed record of Sadi Lecoq, but now the latter has been eclipsed by the Americans. James on the "Bamel" has a still more difficult task to attain to this great world honour.

Again, in the matter of altitude, distance and duration records, we appear to be nowhere, all these having gone to French and American pilots. This may sound somewhat like a reproach to British enterprise. As a matter of fact, it is, of course, nothing of the sort. The establishment of records, and the taking part in International Competitions, is expensive, and the main reason why we have made such a bad showing is because our constructors have lacked the necessary Government encouragement. Given the latter, and it is a foregone conclusion that our designers and constructors will once again justify such encouragement. Let us see to it, therefore, that 1923 has a different story to tell.

The Schneider race furnished one exception, and showed that when the money is forthcoming—in this case by the very sporting efforts of the Supermarine Aviation Works and the Napier Company—British machines can hold their own against the world.

In the matter of the new sport of gliding we have made a wonderful start, and there is every indication that this sport will become popular.

In conclusion, we thank all our readers for their support during the past year, and wish them

A BRIGHT AND PROSPEROUS NEW YEAR.

### FLIGHT

AT THE PARIS AERO SALON.

FLIGHT Stand is at the Exhibit of M. Branger, where FLIGHT can be obtained, and where all communications, Editorial or Advertisement, can be addressed.

London Address:

36, GREAT QUEEN STREET, KINGSWAY.



By THE TECHNICAL EDITOR

In our issue of last week we were able to publish a brief account of the machines shown at the Paris Aero Show, illustrated by silhouettes of all the machines, and photographs of some of the more interesting. In the present issue we commence a more detailed reference to the exhibits, dealing with them in alphabetical order. Generally speaking, the Show this year is considerably more interesting than have been previous ones, and, although some of the constructional methods employed may not appeal to us particularly, we think they deserve to be placed on record, especially bearing in mind that conditions in France are very different from those obtaining at home, the objects and methods of French aviation being essentially different from ours. Thus, although we may find nothing much in the French machines suitable for adoption or adaption, we shall at any rate realise in some measure what France is doing, and that in itself is always worth while. As mentioned last week, the features of this year's Show are all-metal (Duralumin) construction, high-lift wings, supercharged engines, and absence of freaks. It is fairly safe to assume that there is not a single machine at the Show which will not fly, while several of them have already been flown. That some of the machines show but little promise may be admitted, but the great majority, if not clever, are at any rate sound, common-sense productions. A few instances of really inspired design are to be found, and the general level is, we think, much higher than has been the case at previous Paris Aero Shows.—ED.

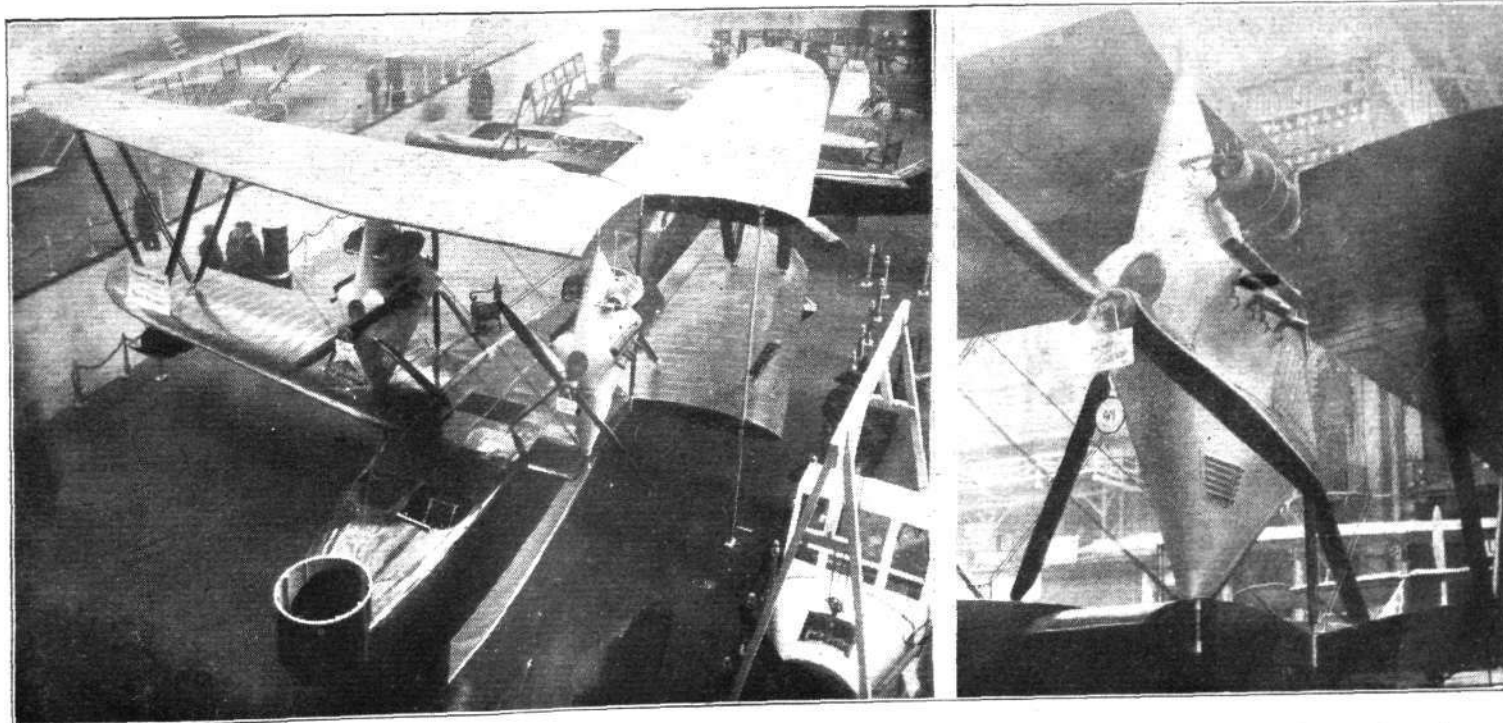
#### SOCIÉTÉ ANONYME BELLANGER FRÈRES— NEUILLY-SUR-SEINE

ALREADY well known in the automobile world, it is only recently that Bellanger Frères have taken up aircraft construction. At the Paris Aero Show one complete machine is shown, a twin-engined flying boat for use with the French navy. In addition, a "commercial" hull is shown, intended to fit into the same set of wings.

The complete machine, designed by Denhaut, possesses several distinctive features, not only in hull design, but also in the aeroplane details. The boat hull is of the flat-sided variety, with Vee bottom and flat deck. The planking is three-ply wood, and the hull is chiefly remarkable for the fact that there is no step, as we have come to understand the term. In place of the step there is merely a sharp change in

the direction of the lower stringers. Behind this "break" there appears to be a short length of hull bottom in which the chine line is slightly concave, although the Vee bottom is retained, extending up to the stern post. It is claimed that this form of hull has been found to get off with a smaller expenditure of power than a similar hull with steps, and that alighting is made with a minimum of shock. It might be pointed out that the break in the lines, corresponding to a step, occurs very far aft, approximately under the rear spar, and therefore, presumably, well aft of the centre of gravity of the machine.

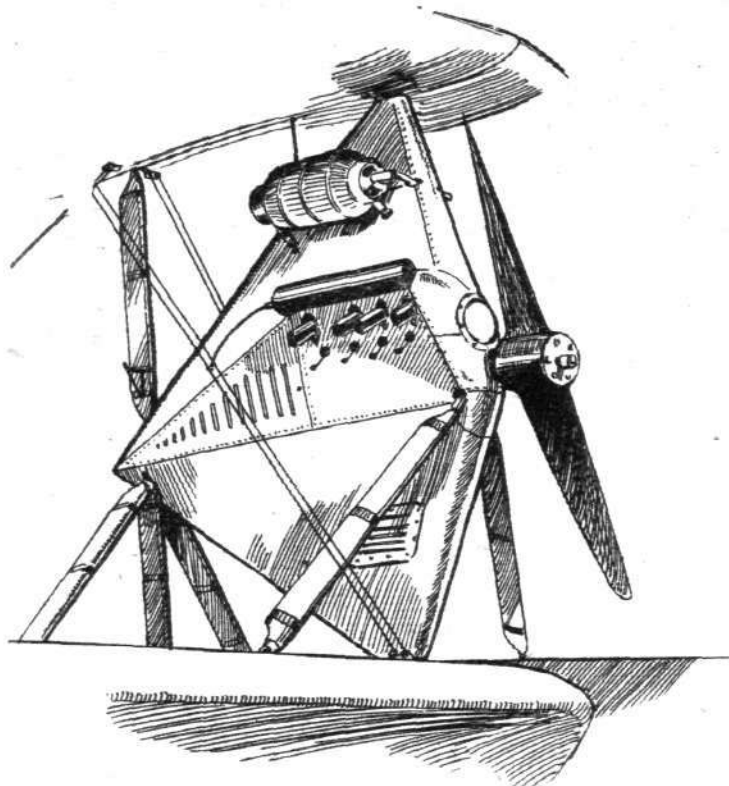
In the extreme nose of the hull is a cockpit for a gunner, the coaming being shaped to take a circular gun-mounting. The cockpit for pilot and engineer is placed approximately half-way between the nose and the leading edge of the lower



THE BELLANGER FLYING BOAT : On the left a view of the machine from the gallery. Note front gunner's cockpit and folded wing. On the right a front view of the port engine.

plane. A considerable distance aft of the wings is another gunner's cockpit.

The wings are of fairly deep camber, and are of unusual plan form in that the trailing edge is straight while the leading edge shows a gentle curve terminating in fairly pointed tips. Both top and bottom planes are fitted with ailerons, these being of high aspect ratio and provided with horn balance. The wing bracing is somewhat unusual, there being a wire-braced centre section between the two engine mountings,



*Bellanger*

Sketch showing unusual engine cowling on Bellanger flying boat.

followed on each side by a wire-braced bay, and finally, towards the tips, a set of Vee struts.

Of very peculiar design are the engine supports and cowls. The engine bearers appear to be carried from the front spars only, or at any rate mainly, and to be connected to top and bottom front spars by the apices of steel tube pyramids. Running back horizontally from the engine to the rear strut is a tail piece, similarly shaped, which serves to streamline the engine housing. The entire engine mounting is cowled in, the only portions projecting being the cam covers, exhaust pipes and sparking plugs. Two Lamblin radiators are mounted on the sides of each engine, and are fitted with the

new type fan-shape shutters, operated by a small differential gear.

The main petrol tanks are carried in the hull and in the curved wing roots of the lower plane. A gravity service tank is built into the top centre section.

The tail surfaces are of usual type, with the exception of the fin, which is of quite unusual thickness, being the full width of the hull and formed integral with it.

The commercial hull shown is similar in outward shape except that there are no gunners' cockpits, a cabin seating six passengers being provided instead. As the power of the Hispano engines is 300 h.p. each, the machine uses 100 h.p. for each passenger, which is scarcely a commercial proposition.

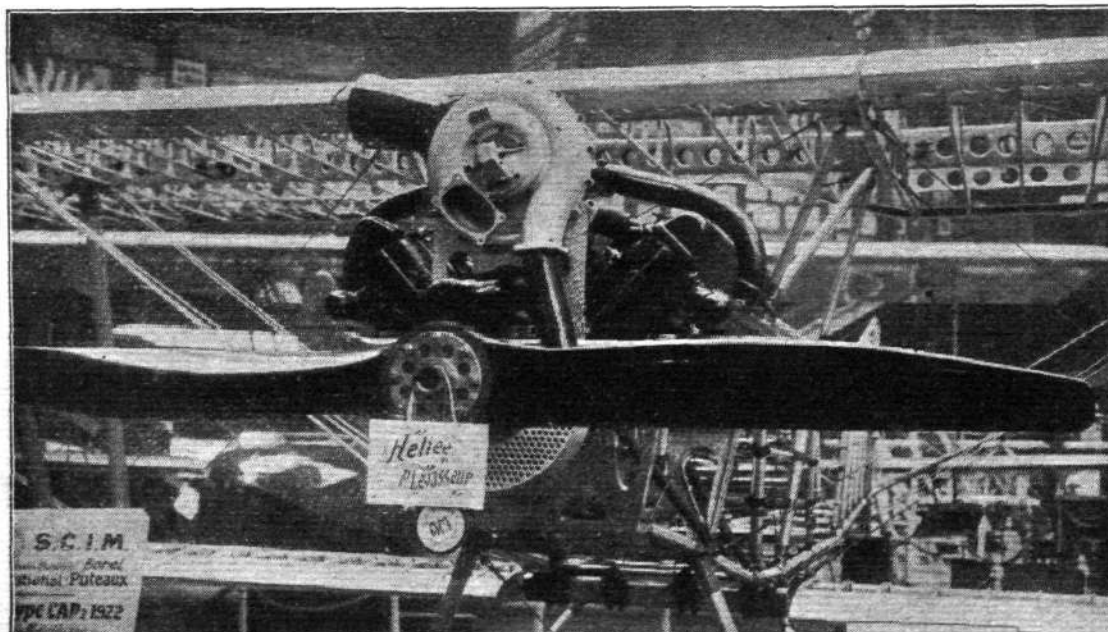
Following are the main characteristics of the Bellanger flying boat: Length of hull, 14 ms. (45 ft. 10 ins.); span, 20 ms. (65 ft. 7 ins.); wing area, 70 sq. m. (750 sq. ft.); weight empty, 2,000 kgs. (4,400 lbs.); total loaded weight, 3,500 kgs. (7,700 lbs.); speed, 180 kms./hr. (112 m.p.h.); range with six passengers and a crew of three, 1,000 kms. (620 miles); endurance, 6 hrs.

#### BOREL S.C.I.M.—PUTEAUX (SEINE)

The machine exhibited by Borel is an all-metal two-seater fighter and reconnaissance biplane with 300 h.p. Hispano engine fitted with one of the Rateau superchargers. The machine is built of metal throughout, Duralumin for spars, longerons, etc., and steel fittings. The fuselage is of tubular construction, Duralumin tubes being used for the longerons and struts, while the fittings are of sheet steel, wrapped around the longerons and secured by tubular rivets passing right through longeron and fitting. It is of interest to note that the diameter of the tubular longerons decreases from nose to stern. The method of reduction is to fit into the steel sockets an aluminium bush, into which the smaller tube fits. Thus at one end of the steel fitting the Duralumin tube just fits, while at the other the bush makes up the difference in diameter between the two tubes. The bracing is piano wire with strainers in the rear portion, while in front the struts more or less triangulate the structure.

The wings are also built entirely of metal, Duralumin for spars and ribs, and steel for the bracing—wire fittings, etc. While the lower spars are in the form of rectangular-section Duralumin tubes, those of the top plane appear to be built up of Duralumin sheet to form a box section, reinforced internally by channel-section strips riveted to the flanges. The sides of both upper and lower spars have circular lightening holes, those of the upper spars being slightly flanged over, while those of the lower spars are quite plain.

The ribs have channel-section flanges, joined by channel-section stiffeners formed from Duralumin sheet. Leading and trailing edges are formed of sheet Duralumin in the shape of horizontal Vee sections. The top plane, which is of greater chord than the bottom, has an extra channel-section stringer behind the rear spar and trailing edges, as the spars are placed far forward in the wing section. The main spars are placed at a considerable angle to the chord line, presumably on account of the pronounced stagger. The wing fittings are of steel, and are in the form of stirrups going around the spars.



The Rateau supercharger on Borel all-metal biplane.

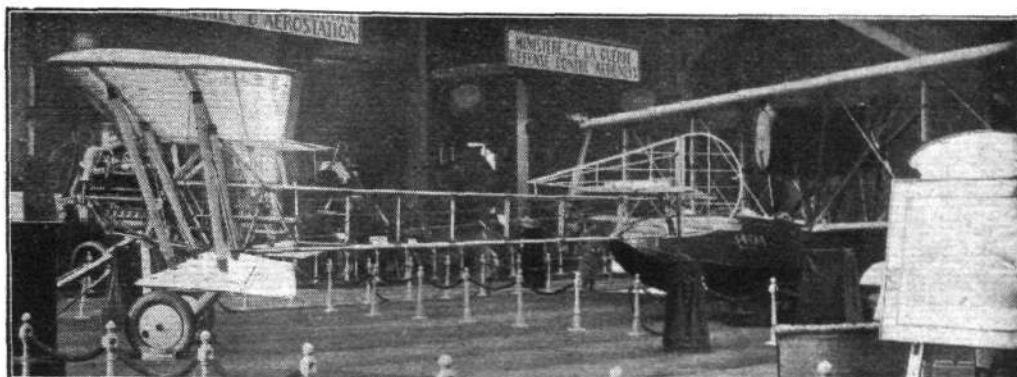
Wing roots permanently secured to the fuselage pass underneath the main fuselage structure, and a top centre-section is carried on struts. The attachment of end pieces to roots and centre-section is by horizontal unions parallel to, and on the centre line of, the spars.

As already mentioned, the Hispano engine is fitted with a Rateau supercharger, while on the rear end of the engine,

off, until at a ceiling of 10,000 m. (33,000 ft.) it is about 175 kms. (108 miles) per hour.

In addition to the complete machine Borel shows a scale model of a huge three-engined passenger machine—a cantilever monoplane, and of an all-metal two-seater night-fighter (C.A.N. 2), also with Hispano engine. The commercial machine (monoplane) is to be fitted with three Lorraine engines

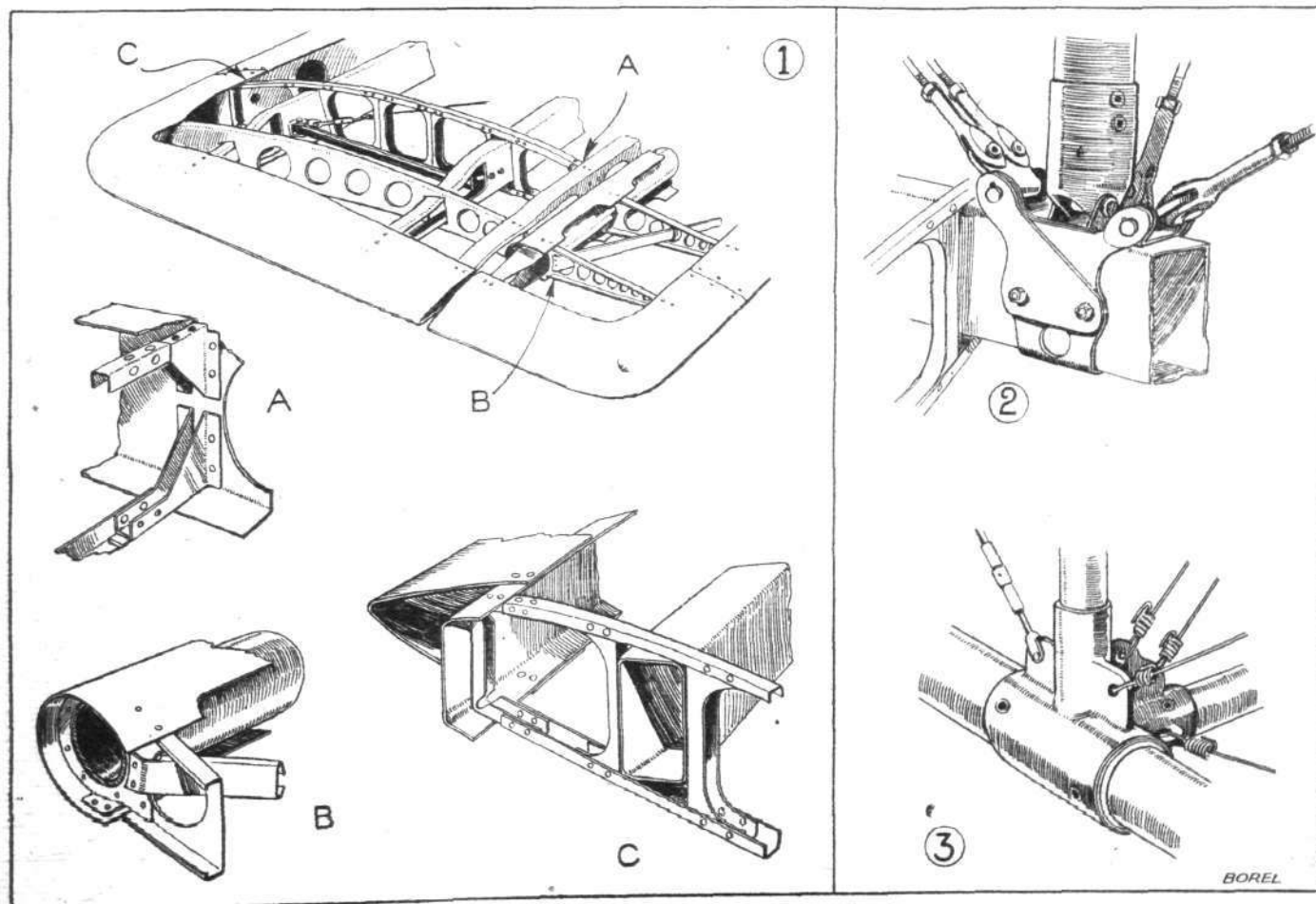
The Borel S.C.I.M. all-metal biplane.



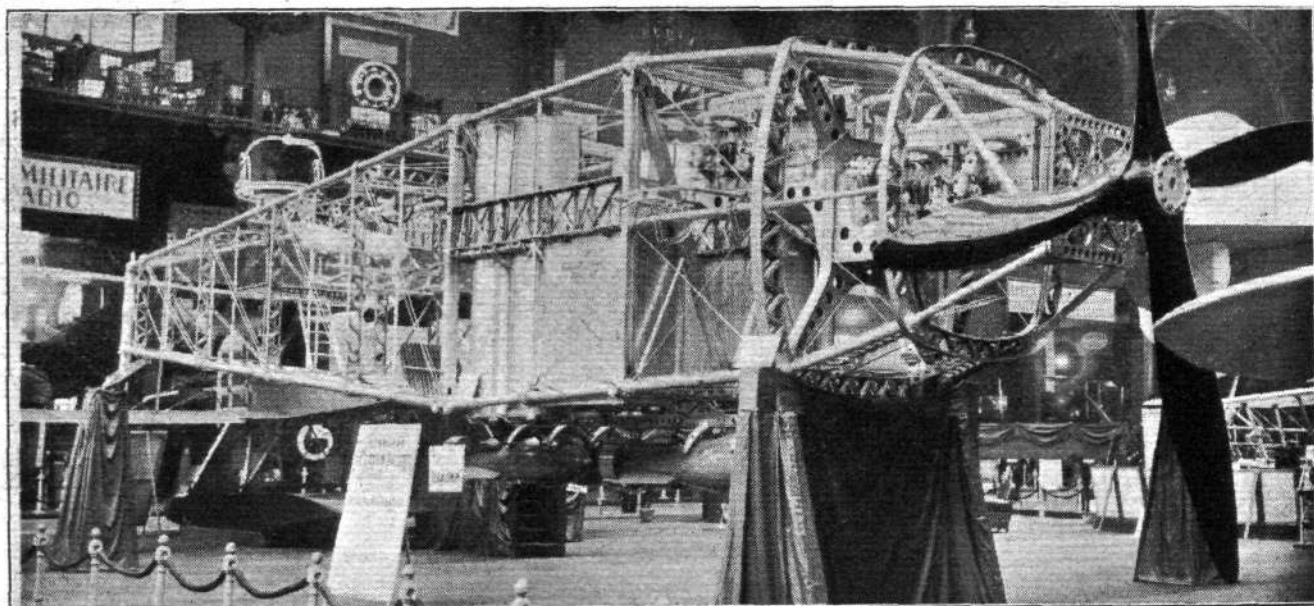
immediately in front of the pilot, is an Odier engine starter. We believe the machine, fuselage as well as wings, is to be covered with fabric. It is shown in skeleton.

The main characteristics of the Borel Cap. 2, 1922, are as follows: Length o.a., 8 ms. 17 (26 ft. 10 ins.); span, 13 ms. (42 ft. 7 ins.); chord, upper 1 m. 90 (6 ft. 3 ins.), lower 1 m. 25 (4 ft. 2 ins.); wing area, 39 sq. ms. (420 sq. ft.); weight empty, 1,000 kgs. (2,200 lbs.); fuel, 325 kgs. (715 lbs.); useful load, 400 kgs. (880 lbs.); total loaded weight, 1,750 kgs. (3,850 lbs.). Fitted with supercharger the speed at ground level is estimated at 200 kms. (124 miles) per hour. The maximum speed is reached at 5,000 m., where it is 248 kms. (154 miles) per hour, and from then onwards the speed falls

of 375 h.p. each, and is designed to carry 30 passengers inside the centre-section of the very thick monoplane wing. It will have a total weight of 22,000 lbs. and a radius of action of 620 miles with full load. The span is 36 ms. (118 ft.) and the total wing area 240 sq. ms. (2,582 sq. ft.). According to wind tunnel tests at St. Cyr, the machine should have a speed near the ground of 202 kms. (125 miles) per hour. With the central engine stopped the estimated speed is 174 kms. (108 miles) per hour. Thus if the full-size machine comes up to the model figures, the power expenditure is only 37.5 h.p. per paying passenger. Asked whether the machine would fly with one of the wing engines stopped, the gentleman in charge appeared to think this doubtful.



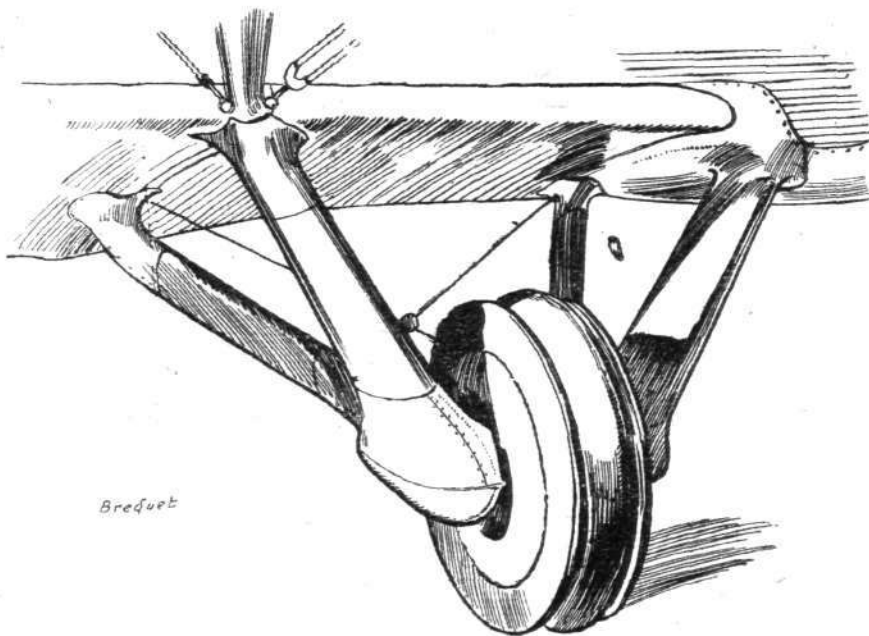
SOME CONSTRUCTIONAL DETAILS ON THE BOREL BIPLANE: 1. Wing tip and details of all-Duralumin construction; the spars are Duralumin tubes of rectangular section, while the ribs are built up of channel sections. 2. Stirrup attachment of wing-bracing wires, and interplane strut socket. 3. A typical fuselage fitting; the Duralumin tube longerons are stepped down in diameter, a bush being inserted in the parallel socket for the smaller tube.



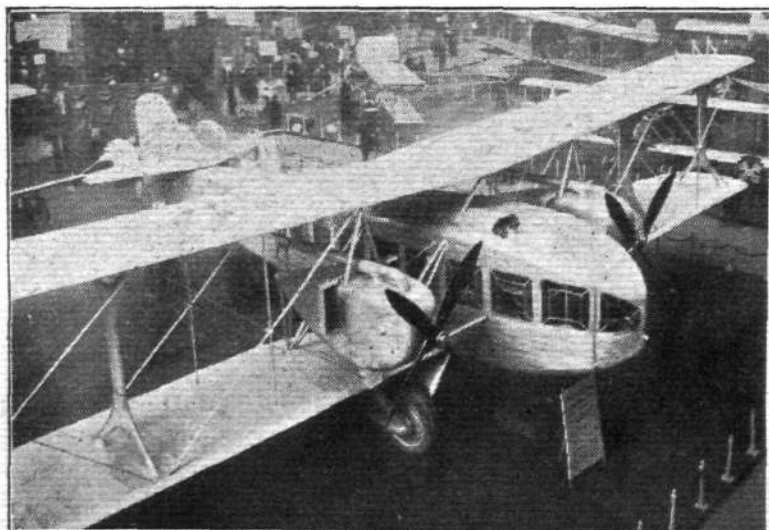
Fuselage of single-engined Breguet "Leviathan."

#### LOUIS BREGUET—PARIS

As a wonderful effort in metal construction on a large scale the Breguet "Leviathan" type XXII, with two Breguet-Bugatti double engines, compels attention by its excellent workmanship and by the very ingenious detail design. When, however, one comes to take into consideration the cost of production and the revenue-earning capacity of the machine as a commercial aeroplane, one cannot help feeling that better value for money could have been obtained with a simpler and cheaper construction in wood. The Duralumin used must have cost a very considerable sum merely as metal. By the time it has been turned into trellis-work frames, channel-section strip covering, etc., and the innumerable small parts riveted together by literally countless rivets, the cost must be tremendous. Before such a machine could be a commercial proposition it would have to be extremely economical to run. Yet according to the estimates of the makers, the useful load—i.e., the lift available for passengers and freight—is 2,200 kgs. (4,840 lbs.), or, on a basis of 480 h.p. each for the engines, the useful load is about 5 lbs./h.p. This figure is reached, or even exceeded, by several British machines which have cost but a small fraction of the price of the "Leviathan."

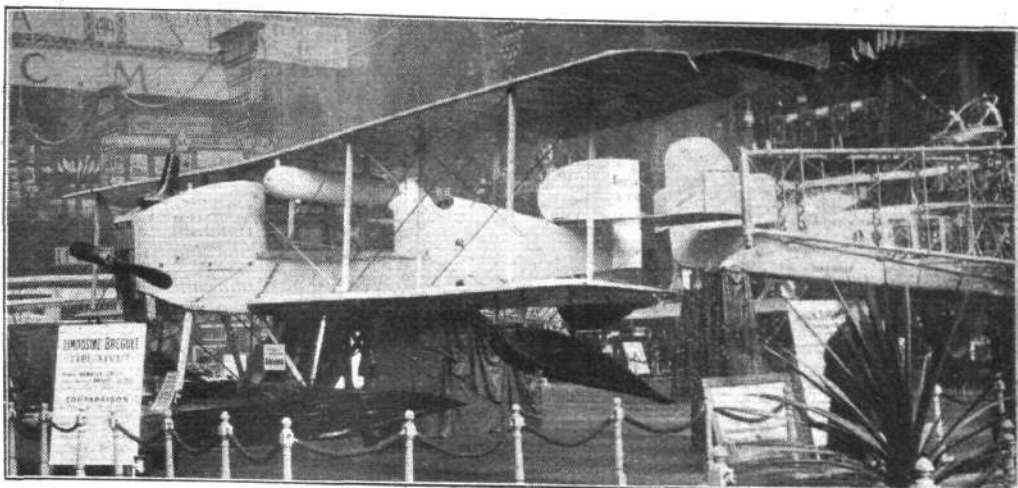


Sketch showing one side of the undercarriage of the twin-engined Breguet "Leviathan."



Two views of the twin-engined Breguet "Leviathan."

The single-float  
Breguet seaplane.



That the Duralumin construction does give a considerable saving in structure weight seems evident from the fact that the structure weight of the "Leviathan" type XXII is only 50 per cent. of the total loaded weight, the actual figures being 3,150 kgs. (6,930 lbs.) and 6,400 kgs. (14,080 lbs.) respectively. This is certainly good for a machine of this type, but still it does not appear to offer reasonable repayment for the high first cost.

The Breguet type XXII is a twin-engined tractor biplane, with the double Breguet-Bugatti engines placed on struts between the wings. The fuselage is of a form of construction similar to that of the single-engined "Leviathan," *i.e.*, with tubular Duralumin longerons and built-up lattice-work frames. The bracing is unusual in that the cables are looped over pulleys so that actual duplication of the cables can scarcely have been effected. A most luxurious cabin is provided, with tables in front of all the seats, and as exhibited at the Show the machine has the covering of the cabin removed from the port side, wax figures being symbolical of future passengers. As a piece of showmanship the tableau is very effective. The front portion of the fuselage is covered with very thin Duralumin in the form of narrow channel sections about 1 in. wide, running in a fore-and-aft direction. On the inside these channels are joined together by narrow U-section strips passed over the sides of adjoining channels, the whole riveted together. It appears probable that during flight this form of covering acts like a drum, as it was noticed that if a finger was pressed on the covering a crackling sound resulted.

The wing bracing of the Breguet "Leviathan" type XXII is somewhat unusual. Of main interplane struts there are but two on each side, and these are of the single type with forked ends, first introduced on the Breguet "Sesquiplan" last year. In between these main struts are auxiliary struts, hinged in the centre, through which the bracing cables pass, much after the fashion of the early-type Spads. The landing cables are arranged in a manner similar to the fuselage bracing cables, *i.e.*, they are apparently double, but pass over pulleys

at the strut fittings. The main lift wires are in triplicate, a stout cable in the centre, with two smaller cables in front of and behind the larger cable. The end attachments are shown in one of our sketches.

The undercarriage consists of two double and converging Vees on each side, carrying a single, large-diameter Palmer cord tyre. We were not able to ascertain whether or not any springing is provided other than that furnished by the tyre. There is no external evidence of any shock absorbers.

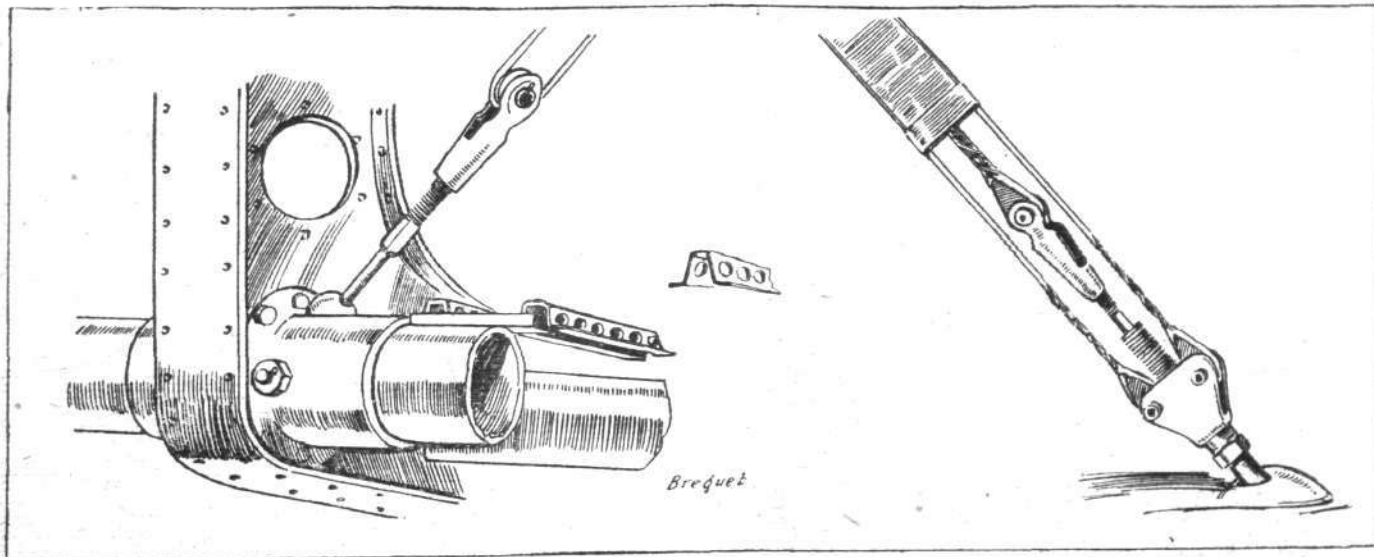
A fuselage of the single-engined "Leviathan" is also shown, the construction of which is exactly similar to that of the twin-engined machine. The 14T single-float seaplane has already been illustrated in *FLIGHT*, and does not call for any comment.

#### CHANTIERS AERO-MARITIMES DE LA SEINE

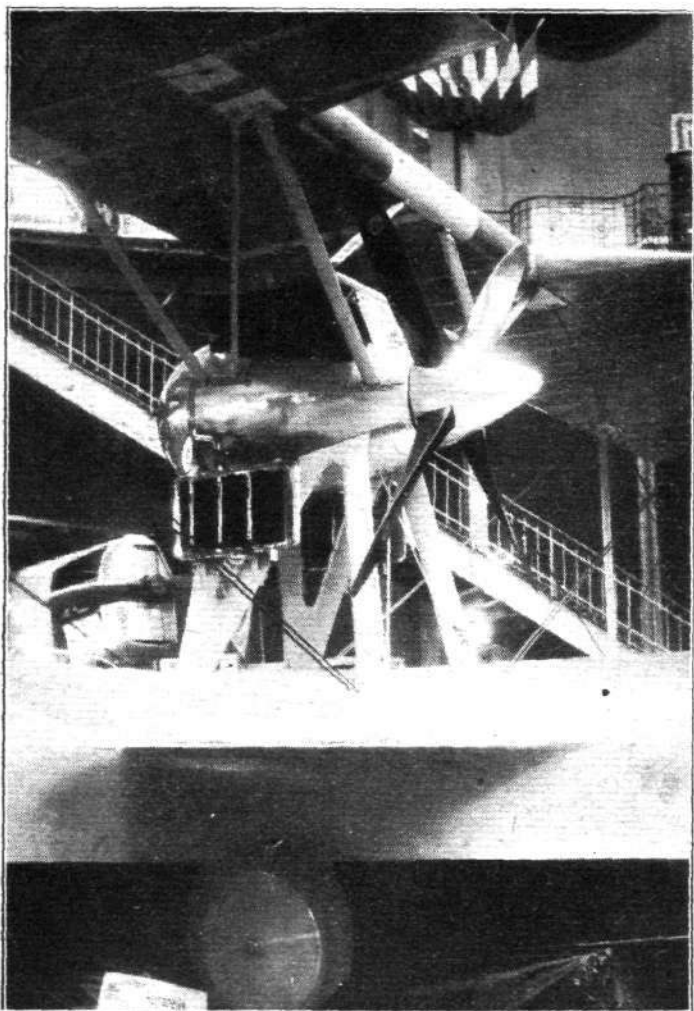
THIS firm, of which Mr. D. Lawrence Santoni is managing director, is showing a small dual-control school machine of the flying-boat type. The C.A.M.S. 30E is very similar to the Savoia flying boats, the designer, M. Conflenti having been with Mr. Santoni on the well-known Italian firm. It had not been intended to exhibit this machine, and the decision to do so was only made quite recently. Consequently, Mr. Santoni pointed out, the machine was not so nicely finished as it might have been. Nevertheless, unless one is very critical, there is not much to find fault with in C.A.M.S. 30E, and the design is delightfully clean.

The boat hull is of three-ply construction, with flat sides and the hollow cambered step peculiar to all boats of Conflenti's design. A wide cockpit in front of the wings gives ample space for pupil and instructor to sit side by side, and there are two sets of controls, wheels for elevator and ailerons, and foot bars for the rudder.

The wings do not present any unusual features. They are of fairly thick section, and have but one pair of struts on each side. The engine cowling is exceptionally neat, as will be seen from the accompanying photograph, and should provide as good streamlining of the engine as it is possible to get.



FUSELAGE FITTING AND BUILT-UP FORMER OF BREGUET "LEVIATHAN" : On the right the peculiar wing-bracing wire fitting, with a stout central cable and two smaller cables front and rear.



The neat engine mounting and cowling of the C.A.M.S. flying boat.

This has been made possible by fitting two very small radiators of an unfamiliar type. At first sight these radiators appear to be Lamblins of special type, but we are informed that they were made by Botali and Clement.

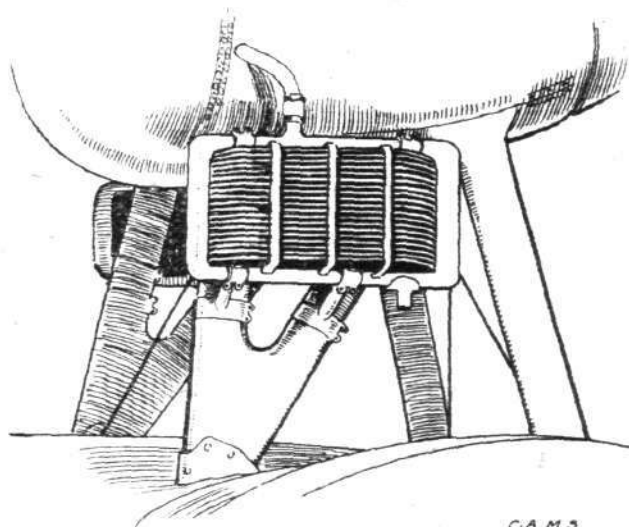
The main characteristics of the C.A.M.S. 30E are as follows: Length o.a., 9.99 ms. (32 ft. 10 ins.); span, 13 ms. (42 ft. 7 ins.) area, 43 sq.ms. (460 sq.ft.); weight empty, 1,080 kgs. (2,380 lbs.); fuel for three hours, 125 kgs. (275 lbs.); useful load, 170 kgs. (370 lbs.); total loaded weight, 1,375 kgs. (3,010 lbs.); landing speed, 60 kms. (30 miles) per hour; maximum speed, 145 kms. (90 miles) per hour.

In addition to the school machine C.A.M.S. produce several other types, among which mention may be made of the racer C.A.M.S. 36, which was built for the Coupe Schneider, but did not get finished in time to take part in the race. It is to be hoped that Mr. Santoni, who will be remembered by readers of FLIGHT as managing director of the British Deperdussin Co. before the War, will come to England next summer to compete for the Schneider Cup.

The C.A.M.S. racer differs from the machine shown in that it is a tractor, with the pilot's cockpit placed aft of the wings. This arrangement has presumably been chosen with a view to providing greater safety for the pilot in case of a crash, and would appear to have a good deal to recommend it.

The C.A.M.S. 31 is an *hydravion de chasse*, with 300 Hispano engine. It is a smaller machine than the 30E, and has a maximum speed of about 120 m.p.h.

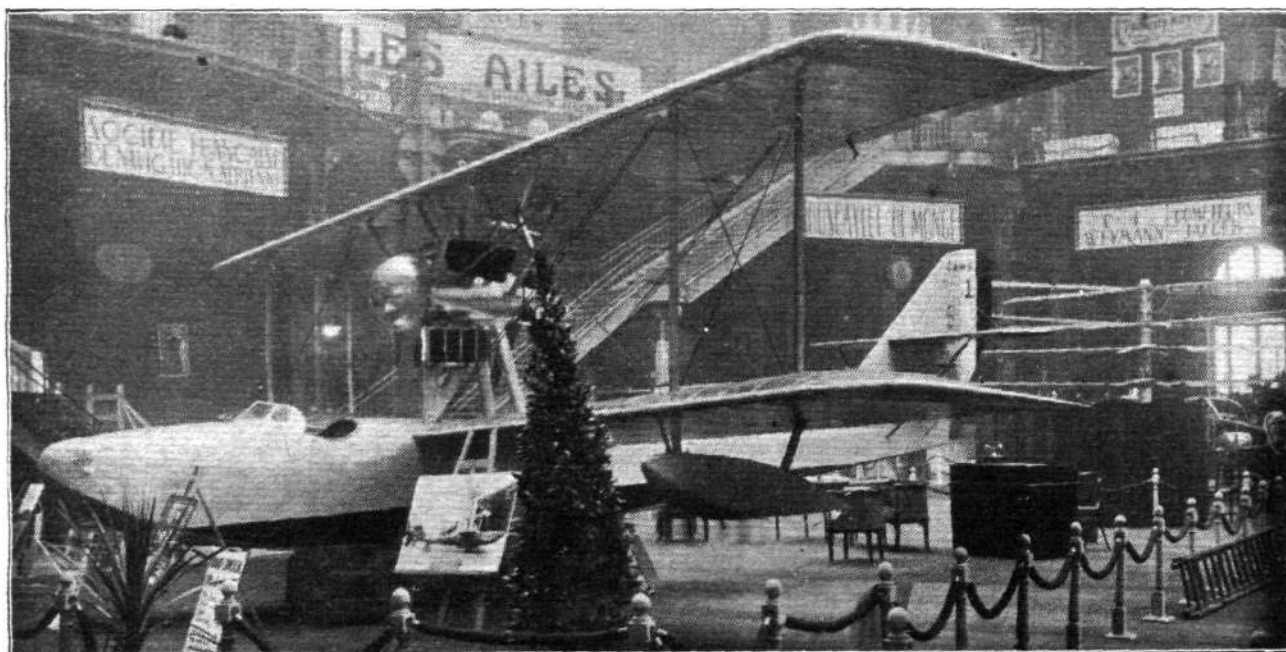
A large commercial flying-boat is now under construction



Sketch showing the small Botali radiators on the C.A.M.S. flying boat.

at the works at St. Denis. This is a twin-engined machine, with two Hispano engines of 275 h.p. each, placed not on the wings but one behind the other above the hull. Thus should one engine fail there is no turning moment, and it is stated that with but one engine running the machine still has a speed of about 80 m.p.h. at 3,000 ft. With both engines running the speed is estimated to be about 110 m.p.h. at sea level. With fuel for 300 miles the paying load of this machine will be 2,150 lbs., or just under 4 lbs./h.p., which is not bad for a twin-engined flying boat.

(To be continued.)



C.A.M.S. side-by-side flying boat for school work.

# GLIDING, SOARING AND AIR-SAILING

It has previously been recorded in these pages that Mr. F. P. Raynham is at present at Torquay with his glider, where he is to take part in the filming of a production by the Ideal Film Producing Co. to be entitled "The Hawk." It would not, perhaps, be quite playing the game to reveal the plot of the film, but Raynham figures in it as the rescuer of a fair damsel in distress, going to her assistance in his glider, which is to alight by the side of a submarine.

UNFAVOURABLE weather has prevented the film being "shot" up to the present, although several trial flights have been made and at least one attempt at the real "picture." Starting from the cliffs overhanging White Beach, Raynham, on December 14, got well into the air, cleared the edge and went "over the top," gliding a short distance and alighting perfectly on the sea. It appears, however, that the motor launch which is taking part in the film was far less under control than Raynham's glider, and did not manage to get into the picture at all, so that all the work will have to be done again.

The glider took the sea very nicely, and Raynham is pleased with her, although unsuitable weather has not permitted as much flying as he would have liked. The machine is now much better on the controls than she was at Itford, and a more orthodox aileron control has been fitted. A few extra coats of Cellon dope have resulted in making her watertight, and it appears that, if necessary, the old glider would float for days.

Nor the least exciting part of the work consists in manhandling the glider up a nearly vertical cliff of some 200 ft. in height, and as the only "landing ground" is the sea, gliding in this locality should not be dull work, although waiting for a suitable wind may well become monotonous. The machine is kept at "Seven Winds," and has to be lifted over a wall every time she goes in or out.

The first French gliding competition, held last summer near

Clermont Ferrand, in Auvergne, was not a great success and the performances attained were in no way remarkable. It appears that the country chosen was unsuitable, and at the second Motorless Aviation Conference, held in connection with the Paris Aero Show, it was decided to hold next year's meeting in the Bay of Vauville, near Cherbourg. The time fixed for the competition is August 6 to 27, and as Cherbourg is not very far removed from London it is to be hoped that a goodly number of British visitors will find their way to the French competition. Probably by then the Supermarine flying boat service will be in operation, and it may be possible to pay a quick visit to the scene of the competition.

PRIZES will be awarded for various types of performances, such as altitude, distance, duration, rising from level ground, etc., and it is stated that the site chosen is ideal for gliding, a cliff of about 400 ft. in height facing the prevailing winds, while at its base is a plain which should form an easy landing ground. Up to the present prizes amounting to close upon £2,000 have been promised.

At the French Aero Show in the Grand Palais several of the gliders which took part in the Combe-grasse meeting are exhibited. First place is naturally given to the Peyret-Maneyrol machine, which is shown with two wax figures pulling on the starting ropes and a passable imitation of Maneyrol, complete with moustache, in the pilot's cockpit. Barbot's Dewoitine monoplane is also shown, having, apparently, had its broken wing repaired.

On the Gnome and Rhone stand is shown a tiny two-cylinder opposed air-cooled engine said to develop 10 h.p. On closer examination the engine, which is an A.B.C. built at the Le Rhone works, is found to be intended for use on gliders, and as a reduction gear of 3 to 1 is fitted, it should be possible to run the engine at high speed and still get reasonably good propeller efficiency. In a later issue we hope to have something more to say about this engine.

## IN PARLIAMENT

LIEUT.-COMMANDER KENWORTHY, on December 14, asked the Secretary of State for Air, if he will state the relative strength of the Air Force stationed in Europe of Great Britain, the French Republic, and the kingdom of Belgium; whether he can state the relative numbers of fighting, spotting, and bombing machines, respectively of modern construction and fit for service maintained in Europe by these three Powers; and what are the numbers of trained pilots observers and mechanics, respectively, maintained by these three Powers in Europe on the active list.

Sir Samuel Hoare: This question falls into three parts:—

1. *The relative strength of the Air Force stationed in Europe of Great Britain, the French Republic and the kingdom of Belgium.*

The strength of the Royal Air Force at present stationed in Europe, including units temporarily in the Constantinople Area, is approximately 15 squadrons, that of the French Air Service 100 squadrons, and that of the Belgian 14. The average establishment of the British squadrons is, however, 12 machines, whilst that of the French squadrons is 9 and that of the Belgian 10.

2. *The relative numbers of fighting, spotting and bombing machines, respectively, of modern construction and fitted for service maintained in Europe by these three Powers.*

The total number of British Active Service Air Squadrons is 32; of French active squadrons 128; of Belgian active squadrons 14; the average number of the aeroplanes being as given above.

It would not be advisable in the public interest to give the total number of British aeroplanes of each type which are of modern construction and fit for service, and, so far as is known, the Governments of France and Belgium have not made public similar information in regard to the French and Belgian Air Services.

3. *The numbers of trained pilots, observers and mechanics, respectively, maintained by these three Powers in Europe on the active list.*

There are on the strength of the Royal Air Force in Europe at the present time 1,158 trained pilots, 75 observers and 19,421 other ranks employed on ground duties. These figures include personnel employed at Flying Training Schools, Depôts, and other miscellaneous establishments. In the current French "projet de loi" provision is made for the maintenance in Europe in 1922 of 3,039 Flying personnel and 30,477 other ranks employed on ground duties.

The second of these two figures is, however, misleading, since a large number

of the personnel employed on ground duties in connection with the French Army Air Service (for example personnel for wireless, recruiting, transport, works, provision of rations and clothing, medical services, etc.) are found from the Army and are not included in the foregoing. This personnel is not budgeted for separately or otherwise distinguished from Army personnel generally, and it is therefore impossible to assess their numbers with accuracy. This consideration also applies in the case of the French Naval Air Service. Figures are not available to classify the flying personnel as pilots or observers.

The Belgian Army, including the Air Service, is at present in process of reorganisation, and, pending completion of this reorganisation, accurate figures for air service personnel will not be available. Prior to reorganisation the approximate total establishment was 2,000 all ranks, but this figure is subject to the qualifications made in the preceding paragraph in regard to the personnel of the French Army Air Service.

Major Atlee asked if he will state the total number of military and civil aeroplanes built and building in France, in French possessions, and in European territory occupied by France; the number of squadrons; the number of aircraft in each squadron; and the number and weight of explosive and chemically charged bombs carried by the latest type of French fighting plane.

Sir Samuel Hoare: This question falls into four parts:—

1. *The total number of military and civil aeroplanes built and building in France, in French possessions and in European territory occupied by France.*

Exact figures are not available as to the war stocks of aircraft held by the French Government. It is therefore impossible to give a figure for the number of military and civil aeroplanes built; the number on the Civil Register, however, on December 1 was 660. As regards the number building, according to the latest information available, French aircraft manufacturing firms have produced 3,300 machines for civil or military purposes during the first eleven months of the current year, making a monthly output of 300 machines. This figure includes aircraft built for export to foreign countries.

2. *The number of Squadrons.* The total number of squadrons at present maintained by France is 128.

3. *The number of aircraft in each squadron.* The normal establishment of machines held by a French squadron is 8 or 10 according to type.

4. *The number and weight of explosive and chemically charged bombs carried by the latest type of French fighting plane.*

The French Government have not, so far as is known, made public any particulars as to the number and weight of explosive and chemically charged bombs carried by their latest types of aircraft.

## New Fokker Commercial Aeroplane.

WHILE at the Paris Aero Show we met Mr. Fokker, who showed us photographs of his new commercial aeroplane, the F.V., which is normally a biplane, but so designed that it can, within a very short time, be changed into a monoplane by removing the lower plane. The F.V. has accommodation for eight passengers inside the cabin, and dual controls are provided so that if desired two pilots can always be carried.

The machine is fitted with a Rolls-Royce engine, and has a total loaded weight of 3,120 kg. (6,900 lbs.). The empty weight is 1,200 kg. (2,640 lbs.), so that the structure weight must be remarkably low, due to some extent, presumably, to the fact that the machine has thick wings although being a biplane.

The wing area, as a biplane, is 750 sq. ft., giving a wing loading of 9.2 lbs./sq. ft.

## NOTICES TO AIRMEN

### Importation of Dogs by Aircraft from Abroad

A CASE having occurred recently of the importation of a dog into this country by air without authority, attention is drawn to the Importation of Dogs Orders of 1914 and 1918 (No. 2), which prohibit the importation of dogs from abroad, whether originally taken from this country or not, unless their landing has been authorised by licence previously obtained from the Ministry of Agriculture and Fisheries (4, Whitehall Place, London, S.W. 1).

(No. 134 of 1922.)

### Alternative Cross-Channel Air Route: Weather Reports

1. WHEN bad weather conditions prevail on the normal air route between Croydon and the Channel, reports from certain stations on an alternative route are now available at Croydon and Lympne for communication to pilots of machines in flight.

2. The places for which information is available at these times are the Isle of Grain, North Foreland and Deal.

3. Paragraph 2 of Notice to Airmen No. 80 of 1922 is amplified accordingly.

(No. 135 of 1922.)

### Holland: Use of Deventer Landing Ground Discontinued

1. THE landing ground at Deventer is no longer available for use.

(No. 136 of 1922.)

### France: Civil Landing Grounds, Military Aerodromes, etc.

1. *Civil Emergency Landing Grounds.*—The following additional grounds are now available:—

(a) *Chatillon-sur-Seine.* *Position.*—Lat.  $47^{\circ} 51' N.$ , Long.  $4^{\circ} 35' E.$  Situated  $1\frac{1}{2}$  kms. to the south of Chatillon, at a height of 264 metres (865 ft.) above sea level. *Dimensions for landing.*—500 by 500 metres. *Supplies.*—No supplies are available. There is a resident caretaker.

(b) *Saint Dizier.* *Position.*—Lat.  $48^{\circ} 38' N.$ , Long.  $4^{\circ} 55' E.$  Situated 3 kms. west of St. Dizier, at a height of 146 metres (480 ft.) above sea level. *Dimensions for landing.*—650 by 600 metres. *Supplies, etc.*—No supplies are available. There is a resident caretaker. *Telephone.*—A telephone has been installed.

2. *Civil Landing Ground, Toulouse.*—The dimensions for landing have been increased to 600 by 600 metres, and three hangars are now available.

3. *Military and Naval Aerodromes.*—The following military or naval aerodromes are additional to those notified in Notice to Airmen No. 97 of 1921. These aerodromes are available for use by civil aircraft in cases of emergency only, i.e., when pilots are unable to reach a civil air station.

Assistance can only be given by the French military or naval authorities in exceptional circumstances, and, in all cases, only so far as the personnel and material available permit.

(a) *Military Aerodromes.*—Behonne (3 kms. N.E. of Bar-le-Duc); Bourg ( $2\frac{1}{2}$  kms. S.S.W. of Bourg); Bouy (2 kms. S. of Mourmelon-le-Grand); Coetquidan (18 kms. E. of Ploermel, 6 kms. N.N.W. of Guer); Gray (3 kms. S.E. of Gray); La Bêle (7 kms. N.N.E. of Nantes); St. Omer ( $2\frac{1}{2}$  kms. S.S.W. of St. Omer); Sarreguemines (2 kms. N.N.E. of Sarreguemines); Sissonne (2 kms. E.S.E. of Sissonne); Vesoul (3 kms. N.N.E. of Vesoul).

(b) *Naval Aerodrome and Airship Station.*—Cuers-Pierrefeu (20 kms. N.E. of Toulon).

(No. 137 of 1922.)

### "Rules as to Lights"

1. ATTENTION is drawn to Schedule IV, Section 1, of the Air Navigation Order, 1922, in which are prescribed the lights to be exhibited by aircraft between the hours of sunset and sunrise. In the interests of public safety, it is essential that these "Rules as to Lights" shall be complied with by all owners of registered aircraft.

2. Failure to comply with these provisions will result in liability for penalties under Article 23 of the Order.

(No. 139 of 1922.)

### France: Night Landing Arrangements, Customs Service at Lyons Aerodrome

1. *Night Landing Arrangements.*—(a) The following arrangements for night landing are in use at French aerodromes:—

As far as possible an illuminated "T" is displayed to indicate the direction of the wind, and the landing area is illuminated by one or more searchlights.

Failing the "T," and occasionally in addition thereto, 4 or 5 white lights and one red light are displayed in a row from a lorry, the red light being placed to windward of the white lights. Landings should, therefore, take place in the illuminated zone parallel with the lights and towards the red light.

(b) The aerodromes of St. Inglevort, Strasbourg and Marignane are now provided with a portable searchlight for night landings. These aerodromes are only lit when a request from pilots has been received in advance or when aircraft are expected.

2. *Lyons (Le Bron).*—A permanent customs service for the clearance of passengers only has been established at this aerodrome.

Freight must be sent to the customs office in Lyons for examination.

(No. 140 of 1922.)

## LONDON TERMINAL AERODROME

Monday evening, December 25

CHRISTMAS traffic has exceeded all expectations, and extra machines have had to be run on several services in an attempt to cope with the demand for seats. Both the Instone Air Line and the Daimler Airway had, however, to close their passenger lists, and refuse bookings, before the end of the week.

The gales during the past week have not interfered to any great extent with the running of the services, except on Wednesday, and even then—when the wind at 2,000 ft. above the Channel was blowing at about 70 miles an hour and Lympne was reporting winds of 50 miles an hour on the ground—the K.L.M. monoplanes carried on as usual. On the outward journey from Croydon to Rotterdam, Mr. Van Der Hoop left Croydon while a 50-mile-an-hour south-east wind was reported from Lympne, and expected to have to land there for petrol. However, even the gale seems to favour the K.L.M., for the wind changed round through at least 45 degrees, with the result that Mr. Van Der Hoop was in Rotterdam within 2 hours 6 minutes. The return flight from Rotterdam to Croydon was undertaken by Mr. Pyl, who, after flying against the gale for 3 hours 25 minutes, was compelled to alight at Lympne owing to approaching darkness.

One of the amazing features of this particular flight was that although Mr. Pyl himself was feeling none too grand after his buffeting, and on arrival at Lympne got down from his seat and went round to the cabin-door expecting to find his three passengers very much the worse for wear, they

were highly delighted with their flight, and had not suffered in the slightest from sickness.

### Manchester "Express" in a Gale

ON Friday Mr. Robinson, piloting a Daimler 34 from Manchester to London against a southerly gale, was compelled to land at Huntingdon for petrol, and, after ascending again, was 1 hour 43 minutes in flying the 60 odd miles to Croydon. He tells me that he looked down at the ground at one place, and, after flying steadily for 5 minutes, glanced down again, to find that he was still over the same spot.

I understand that the German "Albatros" which set out from Berlin to fly to London was damaged when it forced-landed at Bremen, and that the flight is to be started again in a "Dornier" some time this next week.

A new D.H.34 was delivered to the Daimler Airway on Wednesday. I understand that this machine is fitted with extra-large petrol tanks in order to obviate the necessity of going down at Lympne, on the journey from Amsterdam to London, when there is a strong head-wind. In practically all other respects the machine is the same as the other 34's in use on the service.

Rain, unfortunately, spoiled the joy-riding on Christmas Day, but Capt. Muir tells me he has a number of holiday "specials" booked up, including one for a lady who is going to fly to a race-meeting on Wednesday.

A record return trip to Manchester was made by a Daimler "air express" on Saturday, the machine making the out-and-return flight in only 3 hours 45 minutes.

# OIL COOLING\*

By GRANVILLE BRADSHAW.

THE cooling of an internal combustion engine is familiarly known to be one of two types, *i.e.*, water-cooling or air-cooling. With the rapid rise, however, in the volumetric efficiency of engines for aircraft and vehicular use it is becoming more evident every day that any means of cooling an engine which simply depends upon cooling the exterior of the cylinder walls and head is quite inadequate in its scope. It thereby leaves the cooling of the piston to chance, and the need for some more positive means of cooling this vital part is being forced upon us as the power output is increasing. The first symptoms are overheated lubricating oil, and in prolonged runs with many aircraft and racing-car engines the oil was no longer able to adequately lubricate the more highly stressed white-metal bearings.

When it is remembered that the piston-head presents a surface to the high-temperature gases equal to, roughly, one-third of the total combustion space and that the lubricating oil is constantly in circulation against the underside of this head, it is not difficult to understand that a considerable amount of the total cooling of the engine is carried out by the oil itself. (The author referred to Dr. Gibson's paper, read before the I.A.E. in January, 1920, in which this fact was borne out by some figures given which were obtained at the R.A.E.)

From this it can safely be deduced that modern high-efficiency engines are cooled in two ways always in combination, *i.e.*, water and oil-cooling or air and oil-cooling, and the author said he hoped to show that whilst oil-cooling is admittedly only an additional cooling to either of the two generally known forms, it may, by suitable application, provide those remaining advantages necessary to enable that system known at present as "air-cooling" to compete very favourably with the predominant system of water-cooling.

The dual activity of the oil in both lubricating the working parts and in extracting heat from those components in contact with the burning charge does not appear to be fully appreciated by the average designer; at any rate, little appears to have been done scientifically to apply the oiling system in such manner as will produce a high standard of efficiency from both oiling and cooling points of view. The same might be said of the present-day motor-cycle engine or of any engine be it air or water-cooled, if such engine is lubricated by the system (called drip feed) of adding small quantities of fresh oil solely for lubricating purposes instead of the better system of circulating oil in bulk. The inefficiency of the drip-feed system is shown by the fact that in long-distance attempts at Brooklands the rider has to inject several pumpfuls of oil per  $2\frac{1}{2}$  miles lap in order to keep the engine cool. That from 50 to 90 per cent. of this oil is used solely for cooling purposes is readily seen by comparing the consumption of oil in these attempts with the consumption in much larger engines that are more adequately cooled. This excessive consumption should not be taken as an indication that air-cooling is a failure as such, but rather should it be taken as a basis upon which to found an efficient system of both internal and external cooling.

The author's opinion, confirmed by hundreds of tests, is that water-cooling has obtained its present position as a superior system principally because it has been fortunate enough to have associated itself with a better system of internal cooling. The large majority of air-cooled engines handled by the public have been fitted with diminutive crank-cases of equally small external surface lubricated by similarly small quantities of oil, whilst practically all water-cooled engines have been helped out by a large crank-case (frequently with cooling fins) and a constant circulation of a large quantity of oil.

The ratio of internal cooling to external cooling of any engine naturally varies enormously with every variation in external crank-case area and quantity of oil in circulation; it also varies with the method of applying the oil and the nature of the circuit in draining back to the crank-case sump or cooling tank. Various full-power tests on small single-cylinder and two-cylinder air-cooled engines, unassisted by a large crank-case cooling area and bulk oil in circulation, have shown that such engines will not continue to function properly for prolonged periods at mean effective pressure approaching 100 lbs. per sq. in. with an air blast of 50 m.p.h. unless a continuous stream of oil is passing through the lubricator and the consumption is consequently excessive. The addition of an oil-circulating system with adequate means

of cooling the oil resulted in the maintenance of full throttle for periods of six hours and upwards, with an enormous reduction in carbon deposit and an oil consumption of less than 20 per cent. of the amount that was used when the drip-feed lubricating system was employed.

It would thus appear that there is considerable scope for the improvement of the cooling of modern high-duty engines in the methods used in lubricating these, and that the lubricating system can be improved by the study of the same from both the oiling and the cooling points of view.

An engine fitted with baffle-plates at the base of the cylinders for the purpose of preventing excessive quantities of oil working past the pistons into the cylinders is bad from the point of view of internal cooling, and the author's experience of such engines is that they will not maintain a high mean effective pressure for long periods without producing a hot spot in the centre of the piston and with consequent pinking.

The author referred to some experiments made with an engine of this type, which carbonised on the *under-side* of the piston and "pinked" very badly, where the baffle plates were removed and efficient scraper rings and suitable relief holes incorporated in the piston, with the result that all further deposit on the under-side of the piston was prevented and the pinking period extended.

There can, of course, be no doubt that if sufficient oil is passed over a hot surface the temperature can be kept sufficiently low to prevent all vaporisation and carbonisation, but there is a limit to the permissible quantity that can be used, and this is fixed by the efficiency or otherwise of the means for keeping the oil from passing by the rings and into the combustion chamber. The author then dwelt briefly on this problem, stating that a scraper ring chamfered on its contact face so that it slides over the oil on the upstroke and scrapes down the oil on the descending stroke appears to be the most consistent method of keeping down the oil.

The consumption of oil depends upon the two primary conditions: (a) the pumping of oil up past the piston and into the combustion chamber, where it burns and passes out of the exhaust, leaving an undesirable residue of carbon; and (b) the overheating of the oil, which causes vaporisation and loss in quantity of the lighter grades, according to the temperature reached by the oil or any portion of it.

The first is a matter for mechanical design on the particular engine. The second condition is the one of primary importance. If the oil has to come into contact with any hot spot and the quantity of oil is so small that the temperature cannot be kept down, too much heat may be imparted to the oil in contact and a certain portion of that oil will vaporise and pass out to the atmosphere. This, of course, results in a direct loss and a consequently heavy oil consumption, and there are two ways of obviating this. One is to prevent any oil coming into contact with the point of high temperature. This is extremely difficult, and in any case it appears to avoid the adequate cooling of the piston-head, which depends principally on the oil for its maintenance at a working temperature. The other method is to design with this object in view, which is to adequately cool the part in question and to apply some means of cooling the oil afterwards. This seems to be the most rational solution to the problem, aiming as it does at an increase in all-round efficiency.

From the point of view of internal cooling there can be no doubt but that pistons of a suitable aluminium alloy are infinitely preferable to those of cast iron; in fact, it does appear that the greatest advantage of aluminium for pistons is from the internal cooling point of view. The effective cooling surface of the aluminium pistons is greater because the superior heat conductivity of the metal maintains a greater flow of heat into the skirt of the piston, and this offers a greater surface at a higher temperature to the heat-extracting duty of the oil, the amount of heat extracted being, of course, proportional to the difference in temperature between the piston and the cooling medium.

The author said he had produced conditions of internal cooling which have been so efficient in this connection that the two aluminium pistons in an engine of 90 mm. bore have emerged from a 40-hour bench test not only without a trace of carbon on either surface, but with the maximum temperature showing only a slight discoloration in the centre of the head, the remainder of the piston being the original highly polished aluminium finish. In this case the oil never attained a temperature higher than 160° Fahr.

It is possible now to compete with the water-cooled engine

\* Extracts from a paper read before the Cambridge Aeronautical Society on October 25, 1922.

even on the point of silence. With a knowledge of the fact that many parts of an air-cooled cylinder can now be safely boxed inside the crank-case, certain valve-gear details can be enclosed and can run in the normal lubricating system. With such an arrangement the author had secured silence in quantity production quite equal to any of the water-cooled engines of a similar size, and this silence has been maintained for upwards of 10,000 miles in a manner quite equal to water-cooled practice.

In aircraft work in particular is water-cooling undesirable. The radiator is heavy but flimsy, there are the none too reliable flexible water joints, the dozens of points of possible leakage, etc., etc.

The eventual cooling of the oil after it has collected the heat from the hot internal parts ought to provide no difficulties in an instance where velocity is high.

The conditions of cooling oil and cooling water are very different, and have to be attacked from quite different standpoints. The fundamental differences are that whilst water will flow practically equally whether hot or cold, oil has viscosity varying very greatly with even small temperature differences. Thus oil cannot be effectively cooled by passing it through a long pipe either finned or otherwise, as the oil coming in contact with the walls of the pipe thickens and forms an excellent insulator for the hot core of oil flowing rapidly down the centre of the pipe. A large radiated oil tank exposed to the air currents available is even worse for similar reasons.

One successful method is to form a radiator consisting of a length of pipe coiled in the manner of a simple spring. The oil is passed through this at a high velocity, and as the hottest, and consequently most viscous, oil passes through at the highest velocity it is flung by centrifugal force to the outer ring of the circle, and thus against the walls of the ring of tubing. Another system is to use tubes like ordinary radiator tubes, and to insert in these a close-fitting spiral, like a cork-screw, slid into a pipe carried the whole length of the tubes, thus imparting a circular motion to the oil.

The author said that his experience was that the walls of the crank-case form the best medium. These can have ribs cast upon them, and the oil can be projected by force against the inner walls, this being readily performed by the crankshaft and other rapidly moving parts within the crank-case.

In the case of an air and oil-cooled aircraft engine of the radial type the majority of the cylinder barrel could be submerged into the crank-chamber, leaving a natural sump and enabling bulk oil in circulation to be used instead of the

usual method. The crank-case could be formed with radial ribs, and could conveniently be used as the streamline nose-piece to the aeroplane; thus the whole unit would be self-contained both as regards its internal and external cooling, and it should show a high degree of accessibility. With a vertical or V-type air and oil-cooled engine a small separate oil-cooling radiator would probably have to be placed in some exposed position, but the many other advantages of air-cooling, with its added accessibility, reduction in weight and freedom from narrow temperature limitations, would still be obtained.

The extent to which oil or internal cooling can be utilised is by no means obvious, but that it does form an integral part in the effective cooling system of any high-duty engine there can be no possible doubt.

The author regretted he was unable to give any figures as to the amount of heat that is dissipated from the walls of a crank-case, but he had taken many readings of crank-case temperatures, and these have thrown much light upon the heat-radiating capacity of such. A normal water-cooled aircraft engine of 250 nominal b.h.p. did not attain its maximum crank-case temperature until it had been running for 1½ hours on full load. Its temperature was then 270° F., and it was not provided with any means of cooling the oil. The superficial area of the crank-case was approximately 17 sq. ft., and attention is directed to the possibilities of heat radiation from such a surface at the temperature indicated. The immersing of the greater part of the cylinder barrel in the crank-case added from 5 to 20 per cent. more heat to the oil, according to the amount immersed.

The author stated that oil-cooling possesses great advantages when used in connection with road vehicles in eliminating noise.

The more the air-cooled cylinder barrel is inserted into the crank-case the more are the conditions of a water-cooled engine obtained as regards type and volume of sound.

In concluding, the author pointed out that it is not seriously suggested that oil-cooling can be a complete and effective system as opposed to either of the two systems in common use. Its greatest advantages are found in connection with the simpler system of air-cooling, where it can assist to an extent as high as 30 or 40 per cent.

Even in existing engines a few simple modifications to the lubricating system can improve the effectiveness of the cooling to quite a considerable extent, and the author thought the possibility of improvement by these means justified these notes.

## The International Air Congress, London, 1923

A STRONG Executive Committee under the chairmanship of Maj.-Gen. Sir F. H. Sykes, G.B.E., K.C.B., C.M.G., M.P., has taken in hand the organisation of the International Air Congress which is to be held in London from June 25 to 30 next year. National Committees have been formed in several countries to prepare lists of names for membership of the Congress, and in other countries lists are being obtained through the Aero Clubs or other representative bodies. Membership is limited to those countries which are members of the Fédération Aéronautique Internationale or signatories of the International Air Convention. The subscription is to be £1 (or its equivalent in foreign currencies) for a Member

and 10s. for an Associate Member, who must be a member of the family of a Member. The papers to be read are divided into four groups, which will hold sessions simultaneously, and will cover every aspect of the subject, from fundamental scientific problems to such matters as passport regulations and the organisation of an aerial transport company. The Air Ministry have arranged to hold the Royal Air Force Pageant on June 30, the final day of the Congress. Mr. C. V. Allen having resigned, Lieut.-Col. W. Lockwood Marsh, the Technical Secretary, has been appointed General Secretary of the Congress, the official address of which is—c/o The Royal Aeronautical Society, 7, Albemarle Street, London, W. 1, England.



A D.H.9b, with Rolls-Royce "Eagle" engine, remodelled by the Aircraft Disposal Company.

# THE ROYAL AIR FORCE

London Gazette, December 15, 1922

## General Duties Branch

The follg. are transferred to the Reserve:—  
 Class A.—Flying Officer W. J. Burr, M.C., M.M.; Dec. 17.  
 Class B.—Observer Officer J. J. W. Nicholson; Dec. 15.

London Gazette, December 19, 1922

## General Duties Branch

Flight Cadet E. Reid, having successfully passed through R.A.F. (Cadet) College, is granted a permanent commn. as Pilot Officer; Nov. 19. Flying Offr. T. M. Elworthy is granted a permanent commn.; Aug. 31. The following are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated:—

Flying Offrs.—H. S. Davidson; Dec. 11. J. B. Lynch; Dec. 7. F. E. Vernon; Dec. 7.

Pilot Offrs. on Prob.—D. R. Stewart; Dec. 4. Lieut. J. W. C. Harcourt-Vernon, Northd. Fus., is granted a temp. commn. as Flying Offr. on secd. for four years' duty with R.A.F.; Dec. 5. Pilot Offr. H. J. Toye to be Flying Offr.; Nov. 9.

The following are transferred to Res.:—

Class A.—Flying Offrs.—W. C. Pruden; Dec. 9. C. B. Waters; Dec. 19. Class B.—P. Christopherson; Dec. 20. E. N. Hewitt; Dec. 11. H. Webb; Dec. 6. Observer Offrs.—W. McGowan; Dec. 21. J. S. F. Watson; Dec. 19. Class C.—Observer Offr.—S. P. B. De Moyses Bucknall; Dec. 19.

## Stores Branch

Flying Offr. E. J. Groust is granted permanent commn. in rank stated for accountant duties; Aug. 13, 1921. His name will be placed on gradation list immediately below that of Flying Offr. P. E. D. Addis.

The following are granted short service commns. in ranks stated for three years on active list, with effect from Nov. 23, and with seny. of dates in brackets:—

Flt. Lieut.—J. C. E. Gillham (Nov. 5, 1918).

Flying Offrs.—T. S. James (April 1, 1918), immediately below Flying Offr. A. J. Roberts. F. R. Barton is granted short service commn. as Flying Offr. for accountant duties (Oct. 1). His name will be placed on the supplementary gradation list immediately below that of Flying Offr. W. Vaughan-Shaw.

## Memorandum.

Lieut. M. Todd (Black Watch) is granted rank of Capt., R.A.F., on retirement from Army.

London Gazette, December 22, 1922

## General Duties Branch

Flying Offr. E. P. Dampier is placed on ret'd. list on account of ill-health and is granted rank of Capt.; Dec. 23.

## Memorandum

The permission granted to Sec. Lieut. F. W. Carter to retain his rank is withdrawn on his joining the Army.

London Gazette, December 26, 1922

## General Duties Branch

The follg. are granted permanent commissions in ranks stated. *Gazettes* of dates indicated in brackets, appointing these officers to short service commissions, are cancelled:—

Flight Lieut.—G. M. F. O'Brien, D.S.C., Oct. 24, 1919 (Oct. 24, 1919). Flying Offrs.—F. G. Gibbons, D.F.C., June 9, 1920 (June 15, 1920). H. G. W. Lock, D.F.C., Oct. 24, 1919 (Oct. 24, 1919), since promoted.

The follg. are granted short service commissions in ranks stated, with effect from, and with seny. of, dates indicated:—

Flying Offrs.—C. N. C. Dickson, A.F.C.; Dec. 18. C. B. Wincott; Dec. 14. Pilot Offrs. on Probation.—E. L. W. H. Alms, R. S. Blucke, F. A. Briggs, E. S. Brinsmead, A. W. Daly, B. J. Finn, A. M. A. Forde, J. W. Hardstaff, F. Larman, C. G. H. E. Lumsden, F. C. Marsh, B. C. Mason, C. L. Moores, A. J. R. Moss, E. R. Newbigging, F. J. O'Doherty, O. R. Pigott, F. B. Robinson, J. C. Savory, C. W. A. Scott, G. T. Underhill, A. R. Woodyatt; Dec. 9.

D. K. Whitlock is granted short service commn. as Flying Offr. for three years on active list, with seniority of April 1, 1918 (Jan. 1, 1923). His name will be placed on supplementary gradation list immediately before that of Flying Offr. C. H. Goring.

The follg. are transferred to the Reserve:—

Class A.—Flying Officer R. McK. Jamison, D.F.C.; Dec. 28.

Class C.—Flight Lieut. A. V. H. Gompertz; Dec. 5.

Pilot Officer J. A. R. Stevenson resigns his short service commn.; Dec. 27. Flight Lieut. C. P. O. Bartlett, D.S.C., is placed on retired list on account of ill-health contracted on active service, and is granted rank of Maj; Dec. 27. Flight Lieut. A. Hunter, O.B.E., is placed on retired list on account of ill-health, and is granted rank of Maj.; Dec. 27.

## Stores Branch

The name of Flying Officer J. M. Adams will be placed on gradation list of accountant officers immediately below that of Flying Officer C. W. Rogers.

## Memoranda

Lieut. T. Lund, late R.A.F., is granted temporary commn. as Flight Lieut. for duty under Directorate of Works and Buildings; Sept. 28. Flight Lieut. T. Lund relinquishes his commn.; Nov. 14.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The undermentioned appointments in the Royal Air Force are notified:—

Air Vice-Marshal P. W. Game, C.B., D.S.O., from Air Ministry to Headquarters, R.A.F., India. (Supernumerary.) Pending appointment as Air Officer Commanding. 7.12.22.

Wing Commanders: G. I. Carmichael, D.S.O., A.F.C., from Palestine Wing Headquarters (Palestine Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 22.11.22. G. I. Carmichael, D.S.O., A.F.C., from R.A.F. Depot (Inland Area) to Air Ministry (Dept. of C.A.S.) (D.O.I.). 11.12.22.

Squadron Leaders: G. G. A. Williams, from Aircraft Depot, Egypt (Middle East) to command No. 1 Squadron (Iraq Command). 10.11.22. H. A. Michell, O.B.E. The name of this Officer is as now stated, not "Herbert Arthur Mitchell," as described in R.A.F. Bulletin No. 93, dated 12.12.22. G. S. Marshall, O.B.E., D.P.H., D.T.M. (Medical), from Research Laboratory and Medical Officers' School of Instruction (Coastal Area) to R.A.F. Depot (Inland Area). (Supernumerary.) Whilst attached to Chemical Warfare Experimental Station, Porton. 13.11.22. T. S. Rippon, O.B.E., from Headquarters, R.A.F., Middle East, to R.A.F. Depot (Inland Area) (Supernumerary.) 22.11.22. D'Arcy Power, M.C., from Headquarters, Iraq Command, to No. 1 Squadron (Iraq Command). 24.10.22. J. Rothwell, M.B., from Aircraft Depot (Iraq Command) to R.A.F. Depot (Inland Area). (Supernumerary.) 6.11.22. J. Rothwell, M.B., from R.A.F. Depot (Inland Area) to R.A.F. Hospital, Cranwell. 5.1.23. R. W. Ryan, M.B., from R.A.F. Hospital, Cranwell, to School of Technical Training (Men) (Inland Area). 8.1.23. G. W. Williamson, O.B.E., M.C., from Aircraft Depot (India) to Headquarters, (Iraq Command). 5.11.22. T. F. Hazell, D.S.O., M.C., D.F.C., from No. 55 Squadron (Iraq Command) to command No. 45 Squadron (Iraq Command). 1.11.22. T. F. Hazell, D.S.O., M.C., D.F.C., from No. 45 Squadron (Iraq Command) to command No. 55 Squadron (Iraq Command). 21.11.22. T. H. England, D.S.C., A.F.C., from R.A.F. Cadet College (Ground Wing) (Cranwell) to Aircraft Depot (Iraq Command). 13.12.22. A. R. C. Cooper, from School of Photography (Inland Area) to Station Commandant (Iraq Command). 13.12.22. E. H. Johnston, O.B.E., from No. 24 Squadron (Inland Area) to command No. 45 Squadron (Iraq Command). 13.12.22. W. B. Cushion, from Headquarters, Coastal Area to Headquarters, R.A.F., India. 13.12.22.

Flight Lieutenants: A. Jukes, M.B.E., from R.A.F. Depot (Inland Area) to No. 25 Squadron (Constantinople Wing). 7.12.22. B. McEntegart, Reference to the notification concerning this Officer which appeared in R.A.F. Bulletin No. 93, dated 12.12.22, for "No. 4 Flying School" read "No. 4 Flying Training School." R. J. Sanceu from No. 1 Group Headquarters (Inland Area) to Air Ministry (Dept. of A.M.P.). 11.12.22. F. P. Adams, from Air Ministry (Dept. of C.A.S.) (D.O.I.) to Inland Area Aircraft Depot (Inland Area). 15.1.23. A. C. Collier, from No. 24 Squadron (Inland Area) to Air Ministry (Dept. of C.A.S.) (D.O.I.). 1.1.23. G. S. Reed,

O.B.E., to Headquarters (Iraq Command) on appointment to Short Service Commission. 1.10.22. J. C. E. Gillham, from R.A.F. Depot (Inland Area) to Aircraft Depot (Iraq Command). On appointment to Short Service Commission in Stores Branch. 23.11.22. R. J. Aherne, M.C., from No. 45 Squadron (Iraq) to No. 84 Squadron (Iraq). 1.9.22. P. A. Hall, M.B., B.A., from No. 84 Squadron (Iraq) to No. 45 Squadron (Iraq). 1.9.22. T. Montgomery, M.B., D.P.H., B.A., from No. 30 Squadron (Iraq Command) to Baghdad Combined Hospital (Iraq Command). 30.10.22. A. Briscoe, M.B., from Headquarters (Iraq Command) to No. 55 Squadron (Iraq Command). 23.10.22. J. C. T. Fiddes, M.B., from Headquarters, R.A.F. (Iraq), to Aircraft Depot (Iraq). 22.8.22. J. A. Perdrau, M.D., from School of Technical Training (Men) (Inland Area) to R.A.F. Depot (Inland Area). 12.1.23. R. J. O. Compston, D.S.C., D.F.C., from No. 1 School of Technical Training (Boys) (Halton) to Half-pay List. 29.11.22. R. A. Courtney, M.B.E., from Headquarters (Iraq Command) to Basrah Group Headquarters (Iraq Command). 9.10.22. W. F. Anderson, D.S.O., D.F.C., from No. 45 Squadron (Iraq Command) to No. 55 Squadron (Iraq Command). (Supernumerary.) 22.11.22. E. R. B. Playford, from No. 31 Squadron (India) to No. 28 Squadron (India). 31.10.22. W. A. Kingston, from Headquarters (Iraq Command) to Aircraft Depot (Iraq Command). 5.11.22. R. W. Chappell, from No. 24 Squadron (Inland Area) to No. 70 Squadron (Inland Command). 13.12.22. A. Latimer, from No. 11 Wing Headquarters (Inland Area) to Aircraft Depot (Iraq Command). 13.12.22. A. M. Blake, A.F.C., from No. 5 Flying Training School (Inland Area) to No. 70 Squadron (Iraq Command). 13.12.22. R. F. L. Dickey, D.S.C., from School of Naval Co-operation and Aerial Navigation (Coastal Area) to No. 6 Squadron (Iraq Command). For duty as Adjutant. 13.12.22. F. L. Luxmoore, from No. 24 Squadron (Inland Area) to No. 45 Squadron (Iraq Command). 13.12.22. I. M. Matheson, from Armament and Gunnery School (Inland Area) to No. 70 Squadron (Iraq Command). 13.12.22. I. L. Wincer, from No. 2 Flying Training School (Inland Area) to Aircraft Depot (Iraq Command). 13.12.22. Lieutenant C. E. Driver, M.C. (The King's R.) to Headquarters (Iraq Command). On appointment as G.S.O. 3 (Intelligence). On attachment to Royal Air Force for two years. 1.10.22.

Captain J. C. E. Gillham, from Army (R.A.O.C.) to R.A.F. Depot (Inland Area). On attachment to Royal Air Force, pending appointment to Short Service Commission. 15.11.22.

Lieutenant (Acting Captain) T. S. James, from Army (R.A.O.C.) to R.A.F. Depot (Inland Area). On attachment to Royal Air Force, pending appointment to Short Service Commission. 15.11.22.

Major H. K. Clough, O.B.E., from Army (Half-pay List) to R.A.F. Depot (Inland Area), on attachment to R.A.F. for two years, pending embarkation overseas for duty as D.A.A.G. in Iraq. 15.11.22. From R.A.F. Depot (Inland Area) to Headquarters, Iraq Command. On appointment as Deputy Assistant Adjutant-General. 23.11.22.

## Aircraft in the Navy.

THE Official Navy List for December, just published, contains for the first time lists of the aircraft attached to the Royal Navy. Two groups are working with the forces at home and one with the Mediterranean Fleet. No. 10 Group, with headquarters at Lee-on-Solent, includes the Observers' Training School at that place, with six Fairey float planes; two squadrons at Gosport, each with twelve ship planes; and a torpedo development flight, with three ship planes; the School of Aerial Navigation at Calshot, where there are thirteen boat planes; and the seaplane station at Cattewater, now

used for storage only. No. 29 Group, with headquarters at North Queensferry, includes two squadrons at Leuchars, one with six and one with twelve ship planes respectively.

Of the aircraft carriers, Argus, Ark Royal, Eagle, and Furious, only the first-named has aircraft attached to her, drawing machines as requisite from the base at Leuchars. In the Mediterranean Group there is one squadron, No. 267, at Calafra, Malta, with twenty machines, of which nine are unerecited. The base at Alexandria is in charge of a care-and-maintenance party, but there is a temporary base at Feneraki, with seven seaplanes, and the aircraft carrier Pegasus has four.

# PERSONALS

## Married

The marriage of Flight-Lieut. ROBERT HUGH HANMER, M.C., R.A.F., eldest son of the Rev. Hugh and Mrs. Hanmer, The Rectory, Whitchurch, Salop, and Miss MARY HELEN SPENS, youngest daughter of Mr. and Mrs. Nathaniel Spens, Palace Gate Mansions, Palace Gate, took place on December 19 at Holy Trinity Church, Brompton. Flight-Lieut. G. Ingpen was best man.

Sqdn.-Ldr. JOHN TUDOR WHITTAKER, Officer Commanding R.A.F. in Ireland, was married on December 20 at St. Mark's Church, Ballysillan, to KATHLEEN MARY FINLAY, youngest daughter of the late F. W. Finlay and Mrs. F. W. Finlay, Wolfhill, Belfast.

## To be Married

A marriage has been arranged between GEOFFREY PLUNKET CONYNTHAM GREENE, late Flight Lieutenant, R.N., of Waterpoort, Northern Transvaal, younger son of the Right Hon. Sir Conyngham Greene, G.C.M.G., K.C.B., and Lady Lily Greene, of Belmore House, Lymington, Hants, and DAPHNE MARGARET, only daughter of Col. and Mrs. GERARD LEATHER, of Middleton Hall, Belford, Northumberland.

The engagement is announced between HAROLD MORGAN LEWIS (late Lieut., R.A.F.), third son of Dr. and Mrs. B. MORGAN LEWIS, Sunnyside, Pontypridd, and DORIS MAUD, only daughter of Major and Mrs. W. LEWIS, Pentwyn, Sion Hill, Bath.

The engagement is announced between E. J. KINGSTON MCCLOUGHRY, B.A. Camb., D.S.O., D.F.C., second son of Mr. and Mrs. James Kingston McCloughry, of North Adelaide, and FRED A. LEWIS, second daughter of Sir ALFRED and LADY LEWIS, of Coneybury, Lower Kingswood, Surrey.

## ROYAL AERONAUTICAL SOCIETY NOTICES



**Lectures.**—The following lectures will take place at the Royal Society of Arts, John Street, Adelphi, W.C. 2, during the month of January:—

January 4, at 5.30 p.m.—Professor Junkers on "Metal Aeroplanes."

January 11, at 3.0 p.m.—*Juvenile Lecture.* Mr. R. A. Frazer on "Testing Model Seaplanes."

January 18, at 5.30 p.m.—Major J. D. Rennie, on "Flying Boats."

W. LOCKWOOD MARSH,  
Secretary

## THE MODEL ENGINEER EXHIBITION

The Model Engineer Exhibition opens for the sixth time at the Royal Horticultural Hall, Westminster, on Friday, January 5, for one week.

This year the Exhibition will eclipse all previous efforts to amuse and amaze. Model boats, model engines, model railways, models of every conceivable size, sort and description will fill the vast hall already set down as much too small for the requirements of the Exhibition.

In the Model Boat Section there will be dozens of models of battleships, liners, sailing yachts and motor boats. Among them will be the remarkable display made by the Victoria Model Steamboat Club whose exhibit at the recent Small Craft Exhibition attracted the studious attention of His Majesty the King.

Admiral Sir Reginald Bacon, who will be remembered as having been so closely identified with the work of the Dover Patrol during the War, and himself a very keen model engineer, is offering a Silver Challenge Cup for the best bit of amateur work in the Show.

Another interesting feature will be the Model Making Championship of Great Britain which will be decided during the week the Exhibition is open, a Championship Cup being offered for the best piece of work by a competitor who is not a model maker by profession.

No mechanical exhibition can be said to be complete these days without wireless, and the very latest plant to suit the pocket of every type of visitor will be shown on quite a number of stands. At frequent intervals during each of the days the show is open demonstrations of broadcasting will be given by some of the leading experts.

As usual, the working model railway tracks will be a great feature, and will be in three tiers—the topmost being an electric railway, the intermediate a clockwork railway and the lower a steam railway capable of hauling a considerable number of passengers.

Another wonderful display in the railway world will be the application of wireless to the working of a railway train. Mr. Raymond Phillips, of wireless fame, will give a series of demonstrations of the wireless control of trains running on an elevated track, the train starting, stopping and reversing by the simple operation of touching a switch a long way off with no other connection but the ether between it and the engine.

The Loan Section will house a great prize, the original model of a locomotive made nearly a hundred years ago by the father of the present Sir John Thorneycroft, the famous engineer.

As in previous years, there will be a collection of aeroplane models of various types and sizes, both flying models and exact scale models.

## PUBLICATIONS RECEIVED

*Rigging Notes. F.5 Boat Service. Air Publication 905.* London: H.M. Stationery Office, Kingsway, W.C. Price 9d. net. By post 10d.

*Report of Contest Committee on National Airplane Races.* Selfridge Field, Mt. Clemens, Michigan, October 12-14, 1922.

*British Rainfall, 1921. Meteorological Office—Air Ministry.* London: H.M. Stationery Office, Kingsway, W.C. 2. Price 12s. 6d. net; by post 12s. 11d.

*Report on the Commercial, Industrial and Economic Situation of China in July, 1922.* By H. H. Fox, C.M.G., F.R.G.S. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 1s. 9d. net.

## AERONAUTICAL PATENT SPECIFICATIONS

**Abbreviations:** cyl. = cylinder; I.C. = internal combustion; m. = motor  
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

### APPLIED FOR IN 1921

Published December 21, 1922

- 14,536. C. V. TRELEAVEN. Screw propeller. (189,158.)
- 22,280. T. R. MACMEHEN. Screw propellers. (189,201.)
- 23,790. G. P. GREENFELL, J. ROBINSON and others. Directional wireless systems. (189,266.)
- 25,220. LUFTSCHIFFBAU ZEPPELIN GES. and P. JARAY. Airship sheds. (169,968.)

Published December 28, 1922

- 23,129. W. T. REID and BRISTOL AEROPLANE CO., LTD. Aircraft under-carriages. (189,531.)
- 27,378. H. BOLAS and G. G. PARNALL. Shock absorbers. (189,605.)
- 27,954. H. BOLAS and G. G. PARNALL. Shock absorbers. (189,618.)

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xxii).

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